current rules will not afford adequate protection from co-channel systems operating in and near the GOM. PetroCom has a strong interest in seeing that the Commission adopt special co-channel rules for SMR licensees in and near the GOM that take into account the characteristics of radio signal propagation over water.

## II. Current Co-Channel Rules For Stations In The GOM

### A. The Cellular Service

A station licensed in the cellular radiotelephone service receives protection from co-channel operations based on its Cellular Geographic Service Area ("CGSA"). 47 C.F.R. §22.911(a). The CGSA is the composite of all the service areas of the cells within the system. Id. The service area of a cell is the area within its service area boundary ("SAB"). Id. For land-based stations in the cellular service, the radial distance from a transmitting antenna of a cell to the SAB of that cell is calculated by the following formula:

$$d = 3.0 \times h^{0.34} \times p^{0.17}$$

where "d" is the radial distance in kilometers; "h" is the radial antenna height above average terrain (HAAT) in meters; and "p" is the radial ERP in watts. 47 C.F.R. §22.911(a)(1). For cellular systems licensed to operate in the GOM, the Commission adopted a special rule for calculating radial distances to the SAB:

$$d = 3.0 \times h^{0.30} \times p^{0.15}$$

47 C.F.R. §22.911(a)(2). In adopting this rule for GOM cellular systems, the Commission recognized "that the field strength of electromagnetic radio waves when propagating over large bodies of

water is attenuated less than when their path is over rolling terrain, such as contemplated by the Carey Report."[1] Relying on a technical exhibit provided by PetroCom containing a review of relevant propagation theory and measured field strength data, the Commission concluded that the special formula provided "representations of actual coverage that are sufficiently accurate to determine the CGSAs of [Gulf of Mexico] systems for licensing purposes."

B. The SMR Service

Unlike the cellular service, there are no special provisions protecting SMR stations in the GOM from co-channel interference. GOM stations in the SMR service are afforded interference protection based on the same fixed separation distances applicable to all non-Public Safety trunked and conventional SMR stations and applicants for new stations, regardless of whether the station entitled to protection is transmitting over land or water. 47 C.F.R. §90.621. The separation between proposed stations and existing co-channel systems is a minimum of 113 km (70 miles). 47 C.F.R. §90.621(b)(4). Co-channel stations may be separated by less than this distance by meeting particular ERP and antenna height criteria and separations specified in a short-spacing table, which permits a minimum separation distance of 88 km (55 miles). Id.[2]

[1] Amendment of Part 22 of the Commission's rules to provide for filing and processing of applications for unserved areas in the cellular service, Third Report and Order, 7 FCC Rcd 7183 at para. 4 (1992).

[2] Applicants seeking co-channel spacing at less than the distances prescribed in the short-spacing table must secure a waiver and provide an interference analysis showing that co-channel stations would receive the

However, in contrast to the cellular rules, there is no special rule in the SMR service that protects stations licensed for operations in or near the GOM, where service areas expand due to the propagation characteristics of radio signals over water.

In its Third Report and Order in GN Docket No. 93-252, the Commission retained the existing co-channel protection rules for the cellular and SMR services, thus preserving the different approaches in these services for protecting licensees from co-channel interference.[3] Among other findings, the Commission determined that the existing co-channel interference standards provide for acceptable technical quality and none allowed an unacceptable level of interference that would degrade technical quality.[4] The Commission thus saw no justification in applying interference criteria that would reduce the technical flexibility enjoyed by existing licensees solely for the purpose of conforming technical rules to those of a competing service operating under different conditions.[5]

While the Commission's reasoning for preserving the different co-channel rules in the cellular and SMR service generally may be correct, the current state of the rules afford SMR stations in the

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same or greater interference protection than that provided by the table. Section 90.621(b)(4).

[3] Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, Third Report and Order, 9 FCC Rcd 7988 at para. 145 (1994)("Implementation Order").

[4] Id. at para. 141.

[5] Id. at para. 144.

GOM substantially less protection than what is afforded to cellular stations in the GOM. An obvious disparity exists where the rules have been structured to protect cellular GOM licensees, but no such rules exist for GOM licensees in the SMR service.

## III. A New Co-Channel Rule Is Needed For SMR Licensees In And Near The GOM

### A. The Same Reasons Behind A Special Co-Channel Rule For GOM Cellular Licensees Supports A Special Co-Channel Rule for SMR Licensees In and Near the GOM

The Commission should adopt a special rule for protecting SMR licensees in and near the GOM for the same reasons it adopted a special rule to protect cellular GOM licensees. The SMR and cellular services are technically similar, operating in the same 800 MHz frequency band under comparable rules.[6] The propagation characteristics of SMR in the GOM will be very similar to that of cellular radio.[7] Thus, if the Commission believed (as it did) that GOM cellular licensees would receive co-channel interference from adjacent licensees absent a special protection rule, it should reach the same conclusion for SMR licensees in and near the GOM.[8] Indeed, SMR licensees serving the GOM can expect to receive substantial interference from co-channel systems under the

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[6] See Attachment 1, statement of PetroCom's consulting engineer, p. 1.

[7] Id.

[8] The Commission has recognized that, in order to satisfy the mandate of regulatory parity among "substantially similar" radio services, technical and operational rules should be comparable for such services to the extent practical. See Implementation Order, supra, at para. 11-14. Regulatory parity thus further supports the adoption of special rule for SMR licensees in the GOM as was done for cellular licensees.

Commission's current co-channel rules for the SMR service.[9] Such interference can be expected from land-based facilities as well as those located in the waters of the GOM.[10]

In the rule proposed by PetroCom, a GOM station would be defined as any land-based or offshore station whose authorized 40 dbu service contour extends into the GOM.[11] Any proposed station (including land-based stations) whose 22 dbu contour would extend into the GOM would be subject the GOM co-channel rule. The minimum co-channel separation distance between such a proposed station and an existing GOM station would be 284 kilometers (176.5 miles). A proposed station could be separated from a GOM station by less than this distance by meeting particular ERP and HAAT criteria under a GOM short-spacing table, which would permit a minimum separation distance of 178 kilometers (110.6 miles). Applicants seeking co-channel spacing at less than the distances prescribed in the GOM short-spacing table would be required to obtain a waiver by providing an interference analysis showing that GOM co-channel stations would receive the same or greater interference protection

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[9] See Attachment 1, statement of PetroCom's consulting engineer, p. 1.

[10] Id.

[11] See Attachment 2 for the text of the proposed rule. The technical justification for the proposed rule is provided in the statement of PetroCom's consulting engineer (Attachment 1). Extending protection to land-based stations that serve the GOM is necessary for interference-free communications between such stations and offshore customers. PetroCom already has two land-based stations to serve offshore customers.

than that provided by the table.[12]

## IV. CONCLUSION

The Commission should adopt a special co-channel interference protection rule for SMR licensees licensed for operations in and near the GOM. Such a rule is necessary to avoid the substantial interference to SMR operations in and near the GOM which will result under the existing co-channel separation rules.

Respectfully submitted,

PETROLEUM COMMUNICATIONS, INC.

By: Richard S. Myers
Its Attorney

February 21, 1997

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[12] PetroCom's proposed rule thus mirrors the structure of the existing co-channel rule. Compare Attachment 2 (text of proposed rule) with 47 C.F.R. §90.621(b)(4)-(b)(6).

Attachment 1

Statement of James J. Keller, Consulting Engineer

Stat ent of James J. Keller, Consulting ɛngineer

I, James J. Keller, consulting engineer for Petroleum Communications, Inc. ("PetroCom"), provide this statement to support PetroCom's Petition For Rulemaking which requests a special co-channel rule for protecting Specialized Mobile Radio (SMR) licensees in and near the Gulf of Mexico (GOM).

In 1992, the Commission adopted a special co-channel rule for cellular radiotelephone stations operating in the GOM, based on a technical exhibit which reported the results of a study concerning the actual coverage of a cellular system in the GOM [hereinafter "GOM Study," copy attached]. Due to the technical similarities between the cellular and SMR services, the GOM Study of the cellular service provides an accurate basis for determining the coverage of an SMR system in the GOM.

The cellular and SMR services are very similar in their technical parameters. Both operate in the same 800-900 MHz frequency range. Cellular base stations operate in a range of 869 MHz to 891 MHz and SMR base stations operate between 851 MHz to 866 MHz. The two services operate with similar channel bandwidths, i.e., 30 kHz bandwidths for cellular and 25 KHz bandwidths for SMR. Cellular mobiles operate in the 824 MHz to 846 MHz range. SMR mobiles operate in the 806 MHz to 821 MHz range. The cellular and SMR services are identical in that modern cellular and SMR transceivers operate with noise figures of approximately 4 dB or less. Both forms of transceivers have a 12 dB output speech-to-noise ratio, so the carrier-to-noise ratio in an FM receiver is 10 dB. The calculated signal level required for a 12 dB speech-to-noise ratio is -115.2 dBm for cellular service in the GOM. The calculated signal level required for a 12 dB speech-to-noise ratio is -116 dBm for SMR service in the GOM. The actual operating parameters of an SMR system in the GOM are also identical to the cellular test assumptions. SMR systems in the GOM will use 3 dB gain receive antennas, and the average height of such antennas will be 30 feet above sea level. Thus, due to the close technical similarities between the cellular and SMR services, the measured data collected to determine the cellular service area in the GOM will accurately determine the service area of an SMR system in the GOM.

The real world data from the GOM Study show that the actual signal received at the seaborne receive point exceeded the 12 dB speech-to-noise receiver sensitivity (-115.2 dBm) 90 percent of the time at a range of 27 miles. Therefore, for an SMR system in GOM, based on R-6602 curves with no 9 dB correction factor [since the receive antenna is at 30 feet], a 150 feet antenna operating at 100 watts ERP would require a 25 dBu contour to obtain a 27-mile service radius. This determination matches the actual data from the GOM Study. Using the 18 dB difference between the 40 dBu service contour and the 22 dBu protection contour, this determination then was applied to the established 25 dBu service contour for an SMR system in the GOM, resulting in a 7 dBu protection contour.

Absent a special GOM co-channel rule, SMR licensees operating in or near the GOM will receive substantial interference from co-channel systems under the FCC's current co-channel rules in this service, which do not account for how radio signals propagate over water. Such interference can be expected from land-based facilities as well as those located in the waters of the GOM.

In the GOM co-channel rule proposed by PetroCom, which is based on the technical analysis provided above, a GOM station would be defined as any existing onshore or offshore SMR station whose authorized 40 dBu service contour extends into the GOM. Any proposed SMR station whose 22 dBu contour would extend into the GOM would be subject the GOM co-channel rule. The minimum co-channel separation distance between a proposed station and an existing GOM station would be 284 kilometers (176.5 miles). A proposed station could be separated from a GOM station by less than this distance by meeting particular ERP and HAAT criteria under a GOM short-spacing table, which would permit a minimum separation distance of 178 kilometers (110.6 miles). Applicants seeking co-channel spacing at less than the distances prescribed in the GOM short-spacing table would be required to obtain a waiver by providing an interference analysis showing that GOM co-channel stations would receive the same or greater interference protection than that provided by the table.

James J. Keller
James J. Keller

Date: 2/20/97

TECHNICAL EXHIBIT

## INTRODUCTION

Over water propagation of radio signals in the 800 to 900 MHz frequency range has received far less attention than over land propagation. The Carey model of R-6406 has been the land based standard for many years, but has been known to give pessimistic results, i.e. the actual coverage exceeds the Carey prediction by a significant amount. This has led companies such as LCC to develop software which predicts the 'real world' coverage by incorporating a terrain data base which shows the shadowing of natural terrain variations. This software essentially predicts the range to be a 32 dBu contour rather than the present 39 dBu Carey standard.

The proposed FCC over water formula in FCC 91-311, Further Notice of Proposed Rulemaking, purports to approximate a 32 dBu contour. We note, however, that it appears to be based on a receiving antenna height of 6' which is invalid for communications with typical oceangoing boats in the Gulf of Mexico.

Concerning over water communications, we researched all available data and reports (Okumura, Bullington, W.C.Y. Lee, etc.) and found a wide disparity of predictions. Based on preliminary observations, and measured data furnished to us by Coastel Communications Company, it initially appeared that the most accurate prediction of coverage over water was to simply calculate the radio horizon for the elevation of the base station and the mobile antenna and use this number as the radius of the contour. For a 200' high base station antenna and a 30' high mobile antenna, this radius may be calculated[1] as:

$$d = d_1 + d_2 = (2h_1)^{1/2} + (2h_2)^{1/2}$$

$$d = (2 \times 200)^{1/2} + (2 \times 30)^{1/2}$$

$$d = 20.0 + 7.75 = 27.75 \text{ miles.}$$

This prediction agreed closely with the data supplied by Coastel.

Other predictions (at 200' and 45 watts ERP) to the 32 dBu contour were as follows:

| | |
|---|---|
| Okumura 'open' | 37 miles |
| FCC proposed | 14.314 miles |

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1. ITT 'Reference Data for Radio Engineers', Fifth edition, page 26-13 and page 26-19

With such a wide range of predictions available, and with some data in hand that indicated that the actual range significantly exceeded both the Carey 32 dBu contour and the proposed FCC formula, it was decided that additional real world data should be taken. It was also known that the man-made noise would be lower in the Gulf environment and that the 6' antenna height assumed by Carey was not correct for a typical boat or offshore platform. We also noted that the Carey predictions were based on 50 KHz bandwidth receivers with noise figures of approximately 10 dB. Modern cellular transceivers operate at a bandwidth of 30 KHz with noise figures of 4 dB or less.

## TECHNICAL CONSIDERATIONS

To determine the real world contour in the Gulf of Mexico we considered the following:

KTB in a 1 Hz bandwidth = -174 dBm

KTB in a 30 KHz bandwidth = -174 + 10 log 30000 = -174 + 44.8 = -129.2

Assuming a 4 dB noise figure receiver the tangential receiver sensitivity is -125.2 dBm (Carrier and interference at equal levels).

Per the previously referenced ITT handbook, page 27-2, the man-made noise at 860 MHz is below the noise figure of the receiver by several dB and need not be considered in a suburban (or off-shore) environment.

For a 12 dB output speech to noise ratio (assumed by Carey and supported by Bell System Practices) the carrier to noise ratio in an FM receiver needs to be 10 dB (ITT, page 21-11) thus the received signal level needs to be -115.2 dBm.

Having determined the level of signal required for a 12 dB speech to noise ratio (-115.2 dBm) in the Gulf environment, it was decided that field measurements should be made to determine the actual level of signals existing in the Gulf of Mexico.

## MEASURED DATA

### CASE I

Acting in conjunction with, and with the cooperation of GTE Mobilnet in Houston, measurements were made from their land based cell site located near downtown Galveston. This cell site presently utilizes an omni directional antenna and has the following parameters:

Antenna Height 200' AMSL

ERP = 45 watts

Distance from Gulf approximately 2 miles.

The data displayed in Figure one were measured from this cell site.

CASE II

A second set of measurements was made from a Petrocom cell site located in the Gulf approximately 27.6 statue miles south of Galveston Island. The parameters of this cell site are as follows:

Antenna Height = 150' AMSL

ERP = 100 watts

The data displayed in figures 2 and 3 were measured from this cell site.

## METHODOLOGY

In both cases the measurements were taken from a typical work boat which services the offshore platforms; this boat is of steel construction, 190' long, and has a flat steel roof on the wheel house which is 28' above sea level. A "SmartSam" instrument system (manufactured by Safeco in Chicago, IL) was utilized to gather all data which was recorded onto disk via laptop computer. The SmartSam generates data to -120 dBm and outputs it in ASCII format. The ship's Loran was used to determine the ship's position and location markers were recorded to disk approximately every 15 minutes. The ship's speed was approximately 11 knots. During the recording of the GTE land based cell site (Case I), a 3 dB gain antenna with 2.4 dB of cable loss was mounted near the rear of the wheel house (radiation center at 30'). The data displayed in figure 1 was an "outbound" radial where no buildings were blocking the path between the cell site and the boat. A second SmartSam connected to a second 3 dB gain antenna was used to double check the data being recorded; its output (visual display) agreed closely with the recorded and subsequently plotted data displayed in figure 1. Figure 1 consists of data points measured to a distance of 29.8 statute miles from the cell site. The transmit signal traveled 2 miles over land before reaching the shore line.

The second case was the data taken from the Petrocom platform in the Gulf and displayed in figures 2 and 3. This data was taken with a 3 dB gain marine antenna mounted on a stub mast 3' above the wheel house but below the level of several other antennas, masts and radar antennas. The shielding and reflections from these other structures cause about a $\pm 4$ dB variation in signal level depending on the ship's heading relative to the cell site and may be seen in figure 3. Figure 2 is an outbound radial, figure 3 is a compilation of two outbound radials, one inbound radial and one diagonal as shown in figure 4. There are 14,256 individual data points in this plot. This plot is presented since it is believed that this represents an accurate real world scattering of the data from a typical boat installation. For path loss calculations, figure 2 should be used since it more accurately represents the unshielded antenna situation.

Other real world data which was gathered during the two days aboard ship included making actual telephone calls through the GTE and Petrocom cellular systems to verify that the actual range was consistent with the data being recorded. Both 0.6 watt hand held units were used as well as 3 watt transportables on both 'rubber duck" and externally mounted antennas. The hand held units made acceptable telephone calls to 18 miles, a transportable (with a rubber duck inside the steel wheelhouse) to 20 miles and a transportable on an external antenna to the end of the radials, approximately 28 miles.

## RESULTS

THE ACTUAL OVER WATER RANGE CLEARLY EXCEEDS THE PROPOSED FCC FORMULA

Examination of the plotted data leads to the following conclusions:

1. The real world data from figure 3 shows that the actual signal received at the ship exceeded the 12 dB speech to noise receiver sensitivity (-115.2 dBm) 90% of the time at a range of 27 miles.

2. Carey adjusted his curves downward by 9 dB to modify the actual receiving antenna height of 10 meters to a typical land mobile height of 6'. This 9 dB needs to be "given back" to the offshore cellular carriers due to typical ship antenna heights.

3. The data show that the signal strength versus distance plots are almost linear and do not follow the classical 20 dB/dec free space curves nor any of the known over land models.

4. The reliability factor used by Carey (14 dB at UHF) is incorrect because there are no terrain blockages (only waves) for over water propagation. The measured data indicate ±3 dB for time and multi-path variations and ±4 dB for ship directionality due to typical antenna shielding and reflections in a real world ship installation.

### FORMULA MODIFICATION

THE FCC FORMULA CORRECTLY CONSIDERS THE ANTENNA HEIGHT AND POWER PARAMETERS.

The measured curves represent the received signal strength at a varying distance. Since a decrease in cell site transmitter power output would have a corresponding decrease in received power level, it is possible to plot a locus of the FCC proposed formula range prediction versus distance for a varying power level and compare this to the shape of the real world data. Figure 5 shows a plot of the formula $d = K(p^{.15})$ with K (a constant) adjusted so the curve passes through the FCC proposed data point of 32 dBu at 14.314 miles. This is the projected range from the formula $d = 1.65\ (H^{.3} \times p^{.15})$ where H = 200' and p = 45 watts and corresponds to the GTE cell site parameters and data also plotted in figure 5. It may be seen that the shape of the curve closely corresponds to the actual data. Attempts were made to modify the exponents of H and P in the FCC's proposed formula, but none of these modifications produced an accurate curve fit to the real world data.

## THE CONSTANT IN THE FCC FORMULA IS TOO CONSERVATIVE

Modifying the FCC formula to change the constant to 3.0 gives the second curve shown in figure 5 and gives a range projection of 26.02 statute miles for the GTE cell site. It may be noted that this second curve passes through the 32 dBu contour at 26.02 miles, but it must also be noted that the real world data in figure 5 has not been adjusted to incorporate a $\pm 4$ dB scattering due to the directional characteristics of the ship.

It is therefore believed that a revised constant of 3.0 in the proposed FCC formula will actually predict a real world range where the signal level averages 28 dBu and exceeds the actual receiver sensitivity 90 percent of the time. We are thus referring to our revised formula as a 28 dBu contour rather than a 32 dBu contour.

Applying the revised formula (where the constant is 3.0) to the parameters of the Petrocom cell site yields a predicted range of 26.9 miles. An examination of figure 3 justifies this prediction under all conditions of ship's heading, time, and wave action.

## SUMMARY AND CONCLUSIONS

THE FCC PROPOSED FORMULA FOR OVER WATER PROPAGATION SHOULD BE MODIFIED TO:

$$d = 3.0\ (H^{.3} \times p^{.15})$$

The supporting measurements and data show that the signal level at the range predicted by the above formula exceeds the real receiver sensitivity (-115.2 dBm) at least 90% of the time. Changing the constant factor in the FCC's proposed formula to 3.0 produces results which fit the data obtained during the field test. This formula predicts a contour where the received signal averages 28 dBu for all known variables.

Petrocom supports the over land formula developed by Dr. W.C.Y. Lee contained in the PacTel Cellular comment to CC Docket No. 90-6.

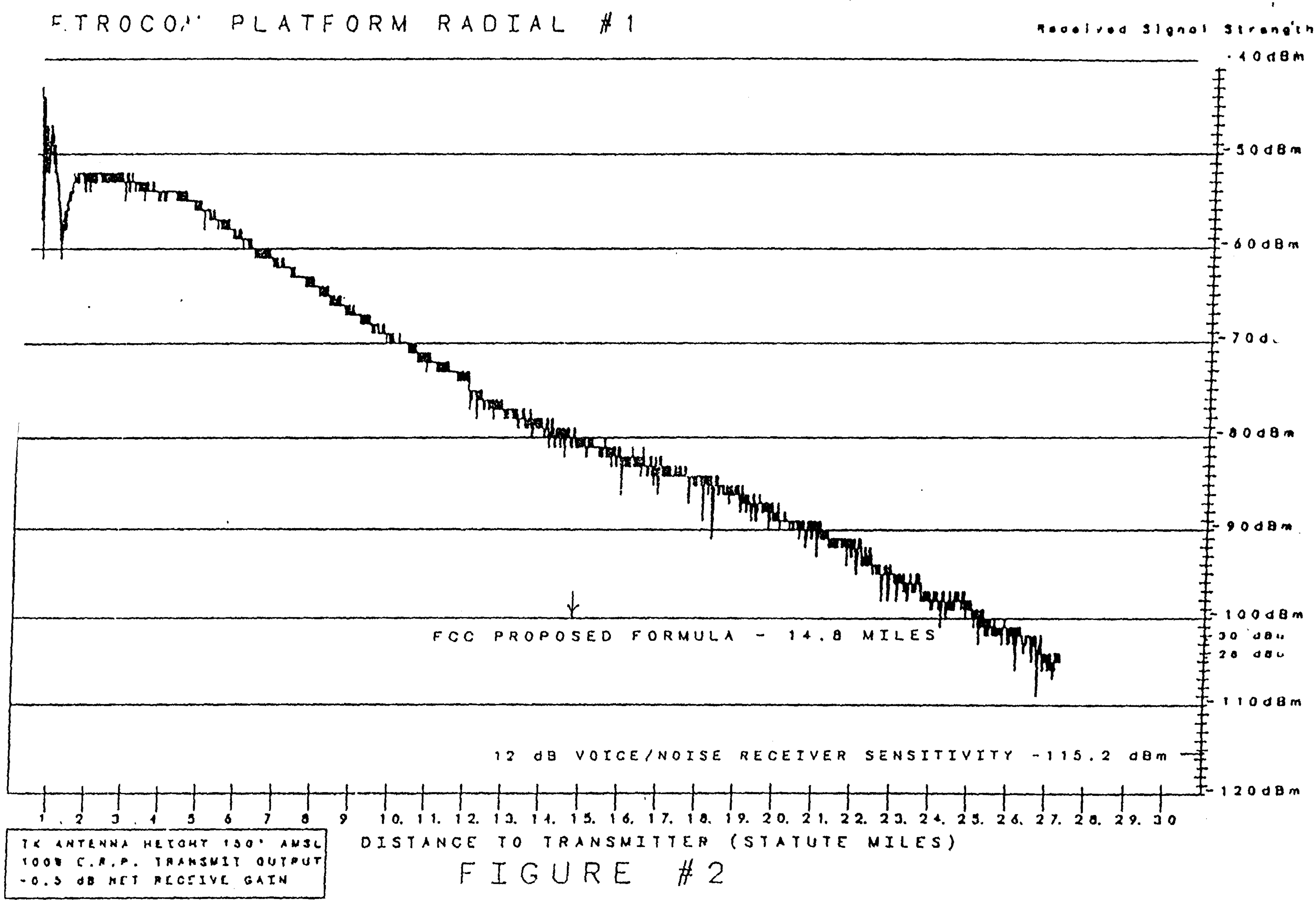

F.TROCO/' PLATFORM RADIAL #1
Received Signal Strength
-40dBm
-50dBm
-60dBm
-70d.
-80dBm
-90dBm
-100dBm
30 dBu
20 dBu
-110dBm
-120dBm
FCC PROPOSED FORMULA - 14.8 MILES
12 dB VOICE/NOISE RECEIVER SENSITIVITY -115.2 dBm
1 . 2 3 . 4 5 6 7 8 9 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30
DISTANCE TO TRANSMITTER (STATUTE MILES)
TX ANTENNA HEIGHT 150' AMSL
100% C.R.P. TRANSMIT OUTPUT
-0.5 dB NET RECEIVE GAIN

FIGURE #2

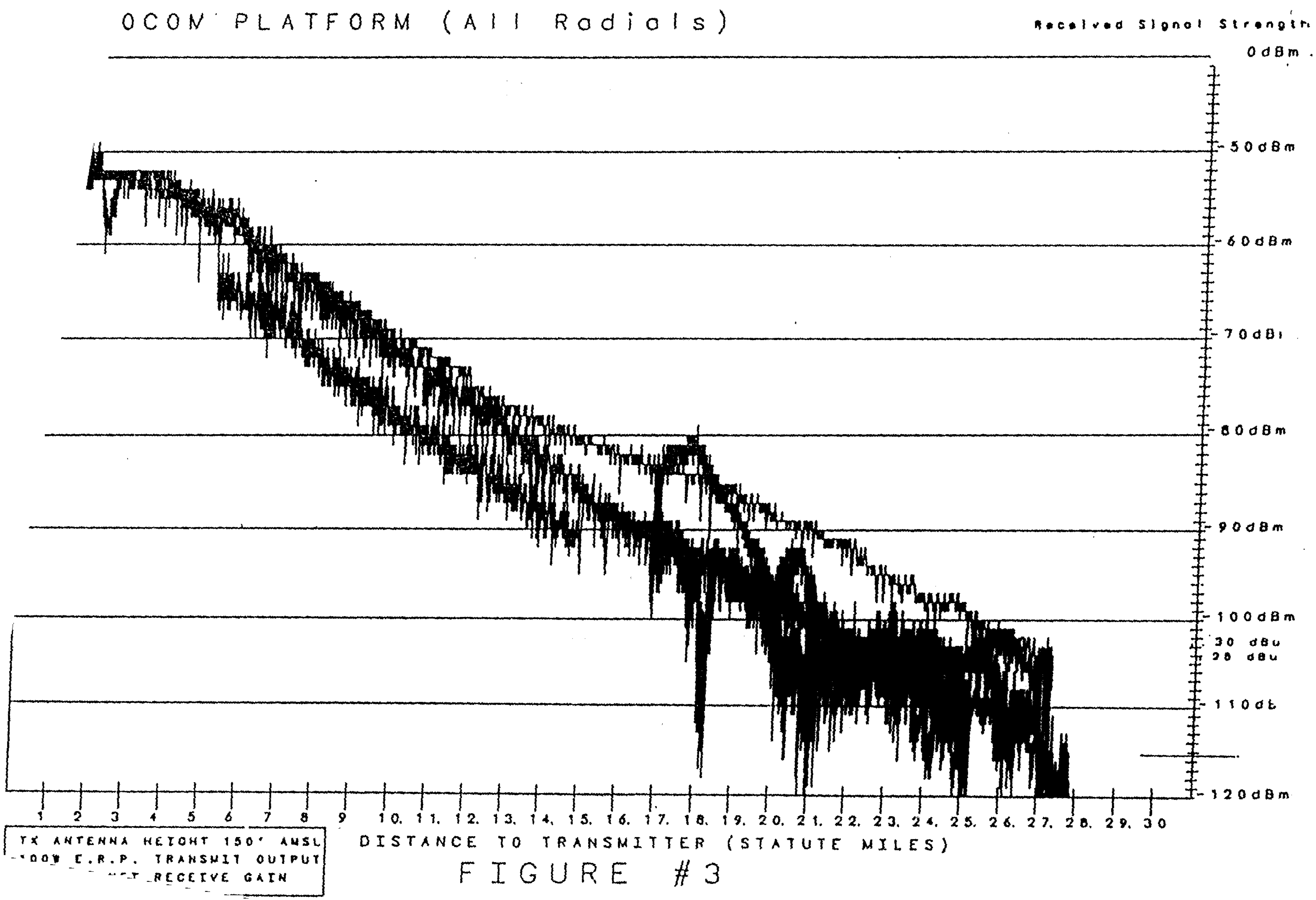
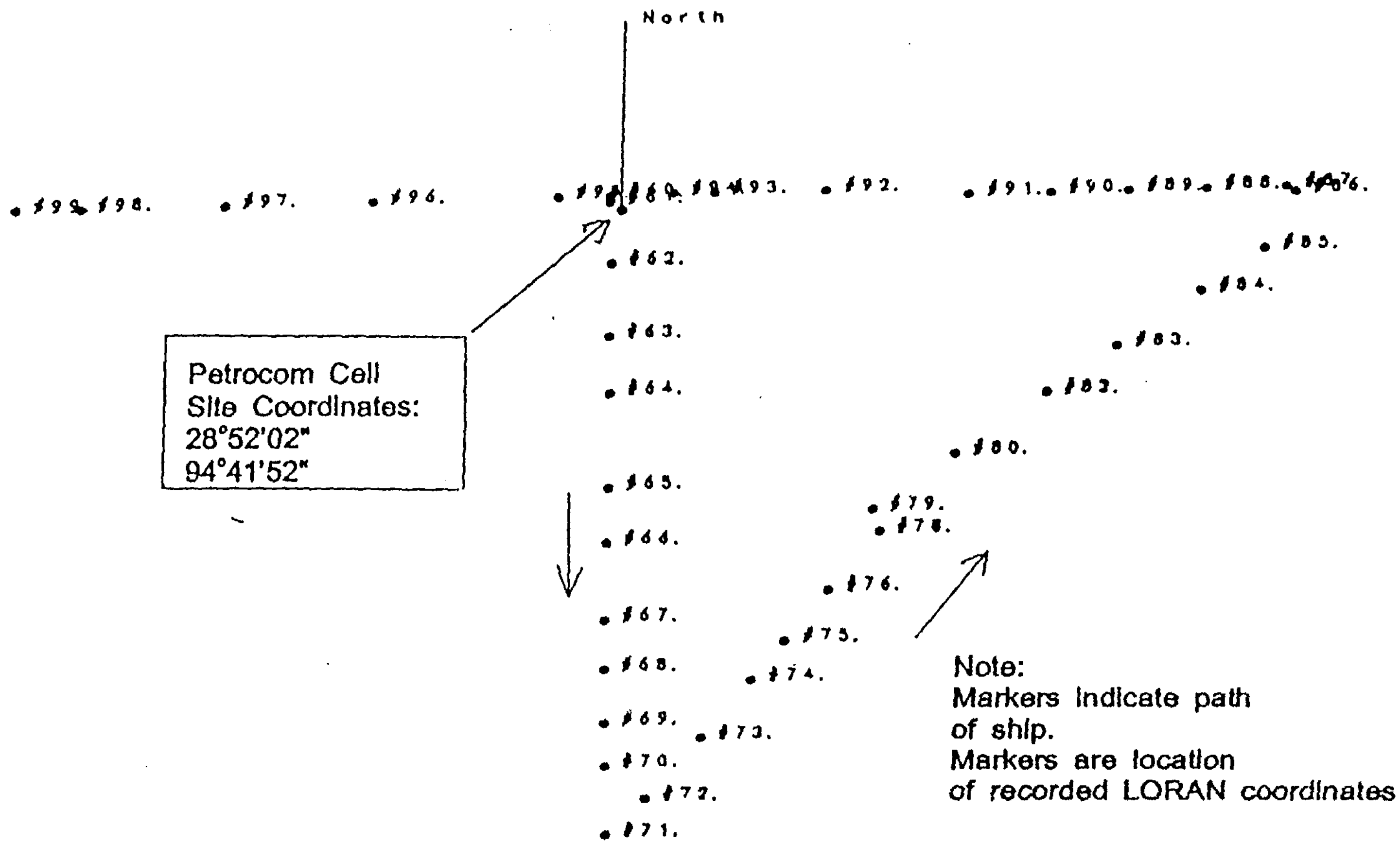

OCOM PLATFORM (All Radials)
Received Signal Strength
0dBm
-50dBm
-60dBm
-70dBm
-80dBm
-90dBm
-100dBm
30 dBu
25 dBu
-110db
-120dBm
1 2 3 4 5 6 7 8 9 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30
TX ANTENNA HEIGHT 150' AMSL
00W E.R.P. TRANSMIT OUTPUT
RECEIVE GAIN
DISTANCE TO TRANSMITTER (STATUTE MILES)

FIGURE #3




Scale: 1 inch = approximately 8 miles

. FIGURE # 4

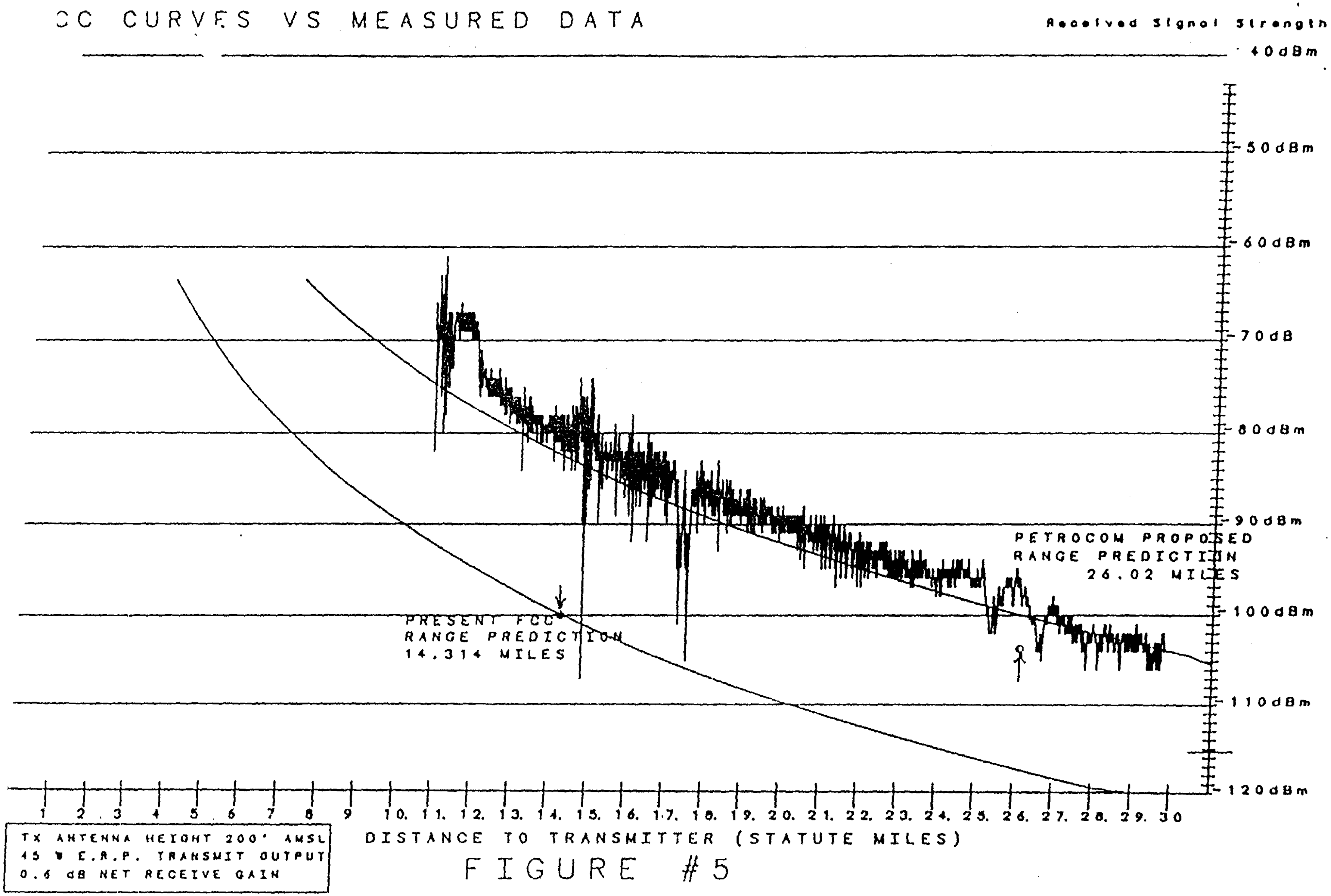

CC CURVES VS MEASURED DATA
Received Signal Strength
40dBm
50dBm
60dBm
70dB
80dBm
90dBm
100dBm
110dBm
120dBm
PETROCOM PROPOSED
RANGE PREDICTION
26.02 MILES
PRESENT FCC
RANGE PREDICTION
14.314 MILES
1 2 3 4 5 6 7 8 9 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30
DISTANCE TO TRANSMITTER (STATUTE MILES)
TX ANTENNA HEIGHT 200' AMSL
45 W E.R.P. TRANSMIT OUTPUT
0.6 dB NET RECEIVE GAIN

FIGURE #5

Attestation of Tom L. Dennis

I, Tom L. Dennis, hereby attest that:

1. I received a B.S. degree from the University of Texas in 1953 and that I have been actively engaged in communications hardware and system design, including propagation analysis, since 1953.

2. I was Vice President of Engineering for Airfone, Inc. during the system design and implementation phases and directed numerous 900Mhz propagation studies. Earlier, I was Manager of Radio Communications for Martin Marietta and still earlier I was an engineering department head at Collins Radio Co.

3. I am a registered Professional Engineer in the State of Texas, Certificate No. 68065.

4. The technical exhibits contained in this comment were prepared under my direction; I was present while the measurements were being taken, and I have thoroughly checked the results.

4. To the best of my knowledge, I believe the material presented and discussed in this technical exhibit to be true and accurate.

Tom L. Dennis

Tom L. Dennis, P.E.
Shaffer & Associates, Inc.

Subscribed and sworn to me this 13th day of January, 1992.

Linda Collins

Notary Public
In and For the State of Texas

LINDA COLLINS
Notary Public - Harris County
My Commission Expires Dec. 07, 1993

STATE OF TEXAS
TOM L. DENNIS
68065
REGISTERED
PROFESSIONAL ENGINEER

Attachment 2: Text of Proposed Rule

Section 90.6__ is amended by adding a new Section 90.621(b)(8) as follows:

**90.621 Selection and assignment of frequencies.**

* * * * *

(8) Applicants for proposed stations whose 22 dBu contour will extend into the Gulf of Mexico (GOM) shall afford co-channel protection to existing GOM stations, defined as any land-based or offshore station in the SMR service whose 40 dBu service contour extends into the GOM. The separation between any proposed station and an existing GOM station shall be a minimum of 284 kilometers (176.5 miles), with the following exceptions:

(i) Upon an applicant's specific request to the Commission or a frequency coordinator, co-channel stations may be separated from GOM stations by less than 284 km (176.5 miles) by meeting certain transmitter ERP and antenna height criteria. The Separation Table for the GOM indicates separations assignable to such co-channel stations for various transmitter power and antenna height combinations. The minimum separation permitted is 178 km (110.60 miles). Applicants will provide the Commission with a statement that the application is submitted for consideration under the Table, a list of all co-channel stations within 284 km (176.5 miles), and the DHAATs and ERPs for these stations and the applicant's proposed station. Applicants seeking to be licensed for stations located at distances less than those prescribed in the Separation Table for the GOM are required to secure a waiver and must submit with the application, in addition to the above, an interference analysis, based upon any generally-accepted propagation model that takes into account propagation over water, that shows that co-channel GOM stations would receive the same or greater interference protection than provided in the Separation Table for the GOM. Requests for separating less than 178 km (110.60 miles) from a GOM station must also include an analysis of interference potential from mobile transmitters to existing co-channel base station receivers. Applicants seeking a waiver must submit with their application a certificate of service indicating that concurrent with the submission of the application to the Commission or a coordinator, all co-channel licensees within the applicable area were served with a copy of the application and all attachments thereto. Licensees thus served may file an opposition to the application within 30 days from the date the application is filed with the Commission.

(A) The directional height of the antenna above average terrain (DHAAT) is calculated from the average of the antenna heights above average terrain from 3 to 16 km (2 to 10 mi) from the proposed site along a radial extending in the direction of the existing station and the radials 15 degrees to either side of that radial.

(B) Additional co-channel distance separation must be afforded to an existing GOM station from an applicant wishing to locate a station less than 284 km (176.5 miles) from a co-channel station, where either the applicant's or the existing station is located at sites with DHHATs of 458 m (1500 ft) and above. The separation between short-spaced co-channel stations shall be determined as follows:

(1) Calculate the DHHAT in each direction between every existing co-channel station within 284 km (176.5 miles) and the proposed station.

(2) In the Table, locate the approximate ERP and DHAAT values for the proposed and existing stations.

(3) When DHAAT values are greater than 458 m (1500 ft), use the required separation for 305 m (1000 ft) and add 4 km (2.5 mi) for every 30.5 (100 ft), or increment thereof, of DHAAT above 458 m (1500 ft) to the distance indicated in the Table. If both the proposed and existing stations have DHAATs of 458 m (1500 ft) or more, the additional distance is separately determined for each station and the combined distance is added to the distance obtained from the Table. Protection to existing stations will be afforded only up to 284 km (176.5 miles).

(C) The separation between co-channel systems may be less than the separations defined above if an applicant submits with its application letters of concurrence indicating that the applicant and each co-channel licensee within the specified separation agree to accept any interference resulting from the reduced separation between their systems. Each letter from a co-channel licensee must certify that the system of the concurring licensee is constructed and fully operational. The applicant must also submit with its application a certificate of service indicating that all concurring co-channel licensees have been served with an actual copy of the application.

(D) A station located closer than the distances provided in this section to a co-channel station that was authorized as short-spaced under paragraph (8)(i) of this section shall be permitted to modify its facilities as long as the station does not extend its 7 dBu contour beyond its maximum 7 dBu contour (i.e., the 7 dBu contour calculated using the station's maximum power and antenna height at its original location) in the direction of the short-spaced station.

# SEPARATION TABLE FOR THE GULF OF MEXICO

| Proposed Station<br>ERP (watts)/ DHAAT (m)[3] | Distance Between Stations (km)[4]<br>Existing Station DHAAT (meters)[3]<br>305 | 215 | 150 | 108 | 75 | 54 | 37 |
|---|---|---|---|---|---|---|---|
| 1000/305 | 284 | 284 | 284 | 284 | 284 | 284 | 284 |
| 1000/215 | 284 | 284 | 284 | 284 | 284 | 283 | 278 |
| 1000/150 | 284 | 284 | 284 | 283 | 278 | 274 | 269 |
| 1000/108 | 284 | 284 | 279 | 276 | 271 | 267 | 262 |
| 1000/75 | 284 | 279 | 273 | 270 | 265 | 261 | 256 |
| 1000/54 | 284 | 275 | 269 | 266 | 261 | 257 | 251 |
| 1000/37 | 281 | 270 | 265 | 261 | 256 | 252 | 247 |
| 500/305 | 284 | 284 | 284 | 283 | 278 | 275 | 269 |
| 500/215 | 284 | 283 | 278 | 273 | 269 | 265 | 260 |
| 500/150 | 284 | 274 | 268 | 264 | 260 | 256 | 250 |
| 500/108 | 279 | 269 | 263 | 259 | 254 | 250 | 245 |
| 500/75 | 272 | 262 | 256 | 252 | 247 | 243 | 238 |
| 500/54 | 267 | 257 | 252 | 248 | 243 | 239 | 234 |
| 500/37 | 262 | 252 | 246 | 242 | 237 | 233 | 228 |
| 250/305 | 286 | 276 | 270 | 266 | 261 | 257 | 252 |
| 250/215 | 275 | 265 | 259 | 255 | 250 | 246 | 241 |
| 250/150 | 266 | 256 | 183 | 247 | 242 | 238 | 233 |
| 250/108 | 261 | 251 | 177 | 241 | 236 | 232 | 227 |
| 250/75 | 255 | 245 | 171 | 235 | 230 | 226 | 221 |
| 250/54 | 249 | 239 | 165 | 229 | 224 | 220 | 215 |
| 250/37 | 245 | 235 | 161 | 225 | 220 | 216 | 211 |
| 125/305 | 268 | 258 | 252 | 248 | 243 | 239 | 234 |
| 125/215 | 258 | 248 | 242 | 238 | 233 | 229 | 224 |
| 125/150 | 251 | 241 | 235 | 231 | 226 | 222 | 217 |
| 125/108 | 244 | 234 | 228 | 224 | 219 | 215 | 210 |
| 125/75 | 238 | 228 | 222 | 218 | 213 | 209 | 204 |
| 125/54 | 234 | 224 | 218 | 214 | 209 | 205 | 200 |
| 125/37 | 229 | 218 | 212 | 208 | 203 | 199 | 194 |
| 62/305 | 252 | 242 | 236 | 232 | 227 | 224 | 218 |
| 62/215 | 242 | 232 | 226 | 222 | 217 | 213 | 208 |
| 62/150 | 234 | 224 | 218 | 214 | 209 | 205 | 200 |
| 62/108 | 227 | 217 | 211 | 207 | 202 | 198 | 193 |
| 62/75 | 221 | 211 | 205 | 201 | 196 | 192 | 187 |
| 62/54 | 216 | 206 | 200 | 196 | 191 | 187 | 182 |
| 62/37 | 212 | 202 | 196 | 192 | 187 | 183 | 178 |

* * * * *

## NOTES

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4. Distances shown are derived from the R-6602 curves and are based upon a non-overlap of the 7 dBu (F50, 10) interference contour (without a 9 dB correction factor added) of the proposed station with the 25 dBu (F50,50) contour (without a 9 dB correction factor added) of the existing station(s). No consideration is given to the 25 dBu service contour of the proposed station and the 7 dBu contour of the existing station(s). The minimum separation of stations will be 178 km (110.6 mi).

<u>Declaration</u>

I, John W. Payne, hereby state the following:

I am President of Petroleum Communications, Inc. I have read the foregoing "Petition For Rulemaking" and, with the exception of those facts of which official notice can be taken and those facts supported by the statement of James J. Keller, all facts set forth therein are true and correct to the best of my own personal knowledge, information and belief.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 18th day of February, 1997.

J. Payne, President

John W. Payne

JENNIFER J. HAMILTON
NOTARY PUBLIC
State of Texas
Comm. Exp. 05-19-98

Jennifer J. Hamilton
2/18/97